

## CLAIMS

1. Polyvinyl alcohol gel, characterised in that the gel comprises at least two polyvinyl alcohols of the types PVA1, PVA2 and PVA3 and a swelling agent, wherein the degrees of polymerisation DP of PVA1 and PVA3 are  $> 1000$  and the degree of polymerisation DP of PVA2 is in the range of 50-100 and PVA1 and PVA2 are predominantly linear whereas PVA3 has a fraction of long-chain branchings.
2. The polyvinyl alcohol gel characterised in that its modulus of elasticity E and/or its strength  $\sigma_m$  in MPa is  $>5$ , more preferably  $>10$ , especially  $>15$ , most preferably  $>20$  and optionally the stress-strain curve has a negative curvature over an interval within the range of 0-300% strain.
3. The polyvinyl alcohol gel, especially according to any one of claims 1-2, characterised in that the gel is obtained from a mixture of polyvinyl alcohol and swelling agent, wherein the viscosity of this mixture during forming is  $>10,000$  mPa and especially the manufacture of the mixture of polyvinyl alcohol and swelling agent is accomplished by thermoplastic processing, for example by extrusion.
4. The polyvinyl alcohol gel, especially according to any one of claims 1-3, characterised in that the gel formation is obtained without using a freeze/thaw cycle, is preferably obtained by storage at a temperature above the freezing point, wherein a heat

treatment is optionally carried out and/or a reduction in the water content takes place during the storage time.

5. The polyvinyl alcohol gel, according to any one of the preceding claims, characterised in that

- a) the degree of hydrolysis of PVA1, PVA2 and PVA3 in mole % is  $>95$ , preferably  $>98$ , more preferably  $>99$ , most preferably  $>99.8$ ; and
- b) the 1,2-glycol content of PVA1, PVA2 and PVA3 in mole % is  $<3$ , preferably  $<1$ , more preferably  $<0.5$ , most preferably  $<0.2$ ; and
- c) the number of short-chain branchings of PVA1, PVA2 and PVA3 per monomer unit is  $<10^{-2}$ , preferably  $<10^{-3}$ , more preferably  $<10^{-4}$ , most preferably  $<10^{-6}$ ; and
- d) PVA1, PVA2 and PVA3 preferably have an atactic conformation, most preferably a predominantly syndiotactic conformation.

6. The polyvinyl alcohol gel, according to any one of the preceding claims, characterised in that

- a) PVA1 and PVA3 have a degree of polymerisation DP  $> 1000$ , preferably  $>2000$ , more preferably  $>3000$ , most preferably  $>5000$ ; and
- b) PVA2 has a degree of polymerisation DP in the range of 50-1000, preferably 60-500, more preferably 70-300, most preferably 75-200.

7. The polyvinyl alcohol gel, according to any one of the preceding claims, characterised in that
  - a) the fraction of PVA2 relative to PVA in wt.% is in the range of 1-95, preferably 2-90, most preferably 3-85; and
  - b) the fraction of PVA3 relative to PVA in wt.% is in the range of 1-80, preferably 2-60, most preferably 3-50; and
  - c) the fraction of PVA relative to PVA and swelling agent in wt.% is in the range of 5-90, preferably 7-95, most preferably 10-80.
8. The polyvinyl alcohol gel, according to any one of the preceding claims, characterised in that
  - a) its modulus of elasticity E in MPa is  $>0.1$ , preferably  $>1$ , more preferably  $>5$ , especially  $>10$ , most preferably  $>15$  and optionally the stress-strain curve has a negative curvature over an interval within the range of 0-300%; and/or
  - b) its strength  $\sigma_m$  in MPa is  $>1$ , preferably  $>3$ , more preferably  $>5$ , especially  $>10$ , most preferably  $>15$  and optionally its breaking elongation  $\epsilon_b$  in % is  $>300$ , preferably  $>400$ , more preferably  $>500$ , most preferably  $>550$ .
9. The polyvinyl alcohol gel, according to any one of the preceding claims, characterised in that its degree of swelling Q in water is in the range of 1.01-3, preferably 1.03-2, most preferably 1.05-1.5.

10. The polyvinyl alcohol gel, according to any one of the preceding claims, characterised in that the gel is obtained as transparent, especially is obtained as transparent without using organic solvents.
11. Use of a polyvinyl alcohol gel according to any one of the preceding claims in the field of biomedicine, for example, in the field of tissue and scaffold engineering and in orthopaedics, for example, as artificial organs and membranes, heart valves, vessels, urethra, tendons, cartilage, meniscus or intervertebral disks, in the field of medicine and pharmaceuticals as dermal gels, for example, as wound coverings and/or for controlled release of active substances via the skin and as controlled release systems for oral, rectal and implantable active substance formulations, in the field of agriculture as release systems for herbicides, fungicides, insecticides, pheromones or fertilisers, in the technical field as filters and technical membranes, in analysis for chromatographic separating methods and electrophoresis, as well as cooling and insulating medium, as hydrophilic films and foils or as substrates for biological cultures or as controlled release systems for odiferous substances.